NUCLEAR DEVELOPMENT AND PROLIFERATION

13 NOVEMBER 1980 (FOUO 11/80) 1 OF 1

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13 November 1980

Worldwide Report

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WORLDWIDE AFFAIRS

BRIEFS

POWERPLANT ORDER--Is Framatome, the subsidiary of Creusot-Loire (of the Empain industrial group), which has a monopoly on nuclear powerplant construction in France, going to get an order from South Korea? Until now South Korea has placed all its orders with Westinghouse (six either in operation, under construction or on order) or with Canada (one under construction). Concerning price, France is a serious contender. The last obstacle is a political one; South Korea's economy is totally dependent on U.S. aid. [Text] [Paris L'EXPRESS in French 11 Oct 80 p 149]

CSO: 5100

JAPAN

HITACHI TO DEVELOP 200 MW POWER REACTOR

Tokyo NIHON KEIZAI SHIMBUN in Japanese 15 Aug 80 p 7

[Text] Hitachi Ltd has turned against the trend toward atomic reactors of ever greater capacity and has begun using its own technology to develop a small reactor of the 200 MW class as a part of its boiling water reactor (BWR) development strategy. The reasons for this decision are that if in the future the export of atomic reactors becomes a serious effort, this will meet the demand from developing countries, and that domestically too, and site constraints will mean a growing need for smaller reactors. A research team for the 200 MW reactor was recently formed within the company, and the conceptual design is to be undertaken soon. Because development of reactors requires huge sums of money, manufacturers have restricted their development activities. Thus Hitachi's active development shows that company's high hopes for the field.

Atomic reactor manufacturers' views on development of small and medium reactors were sounded out in May of this year by the Ministry of International Trade and Industry, which was thinking in terms of atomic power site promotion and multiple use of reactors. Because the ministry's idea was the broad one of asking each company for reactor designs in the 200 to 400 MW class, it was met with attempts to confirm the ministry's intent, asking for a more specific call for designs or blueprints of actual use after development. The mood of avoiding involvement in development was strong. Behind this was the thinking that so far development and production arrangements had centered on large reactors of the 1000 MW class, and it would not be good strategy to extend the battlefront when even those operations were highly unprofitable.

Hitachi realized, however, that light water reactors of diversified capacity would be essential--domestically to find sites in urban areas in addition to those in non-metropolitan coastal areas, and also to meet the demands of the overseas market if it becomes possible to enter that market. Thus Hitachi decided to break away from the other companies and begin development. Moreover, America's General Electric Co. (GE) which has a technical tie-up with Hitachi, has also begun development of a 200 MW class reactor for developing countries, and ASEA Atom (Sweden) which like Hitachi takes part in AET (Advanced Engineering Technology), a group of reactor manufacturers seeking development of new BWR, has completed designs in that class and shifted toward production. This served as further impetus to Hitachi's decision.

Hitachi has for the most part depended on technology obtained from GE for its 780 MW and 1100 MW power reactors. But it intends to design the smaller reactor independently by trying to apply the technology gained so far in development of light water reactors, since the level of technology is nearly the same. To do this it has formed a research team with the goal of completing designs for an experimental reactor in 4 or 5 years, and has begun to firm up the basic concepts for the reactor. If this reactor becomes a reality, it will be the first produced independently by a Japanese manufacturer.

Hitachi recently concluded a contract with America's Bechtel, the world's largest engineering company, for introduction of atomic power plant engineering technology, clearly taking the offensive in the field of atomic energy. This diversification in light water reactor development is a part of this offensive, and may well elicit a response from the other manufacturers.

9601
CSO: 8129/1645

JAPAN

SMALL LWR DEVELOPMENT FORMAT REVISED

Tokyo NIKKAN KOGYO SHIMBUN in Japanese 22 Aug 80 p 1

[Text] The Ministry of International Trade and Industry will set out in JFY 1981 on the development of medium and small light water reactors as one phase of its domestic nuclear reactor development program applying the light water reactor technology cultivated through experience with large type reactors. The method of development will see the abandonment of the competitive race (competitive development) concept between nuclear reactor makers which had been initially planned and the adoption of a policy of an "all Japan mode" in which the combined capabilities of government, academia, and private industry will be mobilized. This new approach not only was the result of some resisting sentiments among the nuclear reactor makers with regard to competitive development but also due to the introduction of competitive development necessarily requires that a development target be clearly defined such that proceeding along the lines of strictly competitive development could involve some awkward situations. As a result, the "all Japan Mode" which involves specialists from the governmental, academic, and private industrial areas merged into a "Medium and Small Multiple Purpose Light Water Reactor Development Committee" (provisional name) will be established in JFY 1981. This committee decided it will be more prudent to hammer out the image of this developmental approach and then go into conceptual design during the latter half of 1981 and 1982.

Makers Resist Competitive Development

The development of medium and small light water reactors is a new policy of this ministry which came to the fore and which is planned for actual development from 1981 on. The light water reactor technology which the Japanese nuclear reactor makers have cultivated during their abundant experience with large light water reactors for electrical power generation (these reactors presently exceed more than a million KW each) will be the base for the development and application of the "Japanese type" light water reactor of the medium and small class (200,000 to 400,000 KW) according to this project.

This situation is the result of that associated with large type reactors which face severe siting difficulties despite the cries for more power generation because the development of medium and small reactors will bring out a product which is more readily adaptable to underground construction and power generation near the consumer and promote siting of power plants. At the same time, 1) medium and small reactors will be developed suitable for export to developing countries with deeprooted need for this type reactors and 2) medium or small reactor whose nuclear heat will be used for industrial needs is targeted which can be used only within a combinat. In this manner a number of applications are envisioned for this new reactor development project.

Another objective is to cut through the attitude characteristic of Japan which has an allergic reaction to large type reactors and develop medium and small reactors for which acceptance can be more easily gained.

This ministry had originally intended to adopt a development mode in which the various makers submitted in competitive manner their ideas on this new type reactor and to award the maker who proposed the most superior idea the contract for conceptual design.

In the House 55 Plan for the development of prefab homes, very effective results were obtained by competitive development, and this was one rationale for this intial plan. On the other hand, competitive development was a target of dissension from private sources and considerable resistance was created. As a result, the specialists from the different areas were selected to draw up the image of this new "all Japan mode" reactor.

2267
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JAPAN

BRIEFS

LEAKAGE AT NUCLEAR POWERPLANT--Tokyo, 14 Oct (JPS)--Leakage of radioactive cooling water was found on October 13 from the emergency core cooling system (ECCS) of the No 1 reactor at the Takahama nuclear powerplant in Fukui Prefecture. The cause of the accident is being investigated. Radioactive effects on the outside is not reported. [Text] [OW141003 Tokyo JPS in English 0922 GMT 14 Oct 80]

CSO: 5100

CZECHOSLOVAKIA

BRIEFS

NEW TURBINE FOR JASLOVSKE BOHUNICE--The sixth 220-megawatt turbine for the Jaslovske Bohunice nuclear power plant is under construction at the Skoda Works in Plzen. The final tests and delivery of the turbine are scheduled for the last quarter of 1980. [Text] [Prague LIDOVA DEMOKRACIE in Czech 10 Sep 80 p 4]

CSO: 5100

FRANCE

NEED TO AIR BREEDER REACTOR QUESTIONS CITED

Paris L'EXPRESS in French 20 Sep 80 pp 100-101

[Article by Francoise Monier: "Did You Say Super-Regenerator?"]

[Text] A seminar involving EDF [French Electric Power Company], CEA [French Atomic Energy Commission], and manufacturers, on super-regenerators behind closed doors. Nevertheless, the debate should be conducted in public. But does the public know what is involved?

Super-regenerator--the word itself is complicated. Nevertheless, the French are going to become familiar with it. EDF is putting pressure on the government today to decide rapidly to study the economic feasibility of an industrial series of super-regenerators [breeder reactors] which for the time being exist in France only in the prototype state. Officially, the decision may be expected in 1983. But, during the days to come, a seminar will be held on this topic behind closed doors by EDF, the French AEC, and nuclear industry operators.

The debate will then be public. Channel 2 and Europe 1 will start it off by programming interviews, discussions, and hot reports on this new effort for an entire week, from 22 until 29 September.

So far, the political parties have never clearly expressed themselves on breeder reactors. For the first time on this occasion, four members of parliament are going to present the viewpoints of their different parties. Pierre Messmer, the former Gaullist premier, who in 1974 launched the conventional nuclear power plant program, completely supports the position of EDF. Dr Arthur Paecht, a UDF [French Democratic Union] deputy from Var, is in favor of breeder reactors: "I even believe that the nuclear industry is an ecological industry in the sense that it creates less pollution than many other forms of energy. Besides, we have no choice. France has neither coal nor oil." For Bernard Deschamps, a communist deputy from the Marcoule region, where an experimental breeder reactor is already in operation, the administration is not moving fast enough: "Security is really in effect.

Our advance in this field is important. This is the only way to meet France's energy needs, in other words, the only way to fight against poverty."

The only opponent of the idea is Paul Quiles, an energy specialist with the Socialist Party. At its last congress, the PS [Socialist Party] adopted a motion approving the construction of conventional nuclear power plants but calling for a moratorium on breeder reactors. "The safety of this technique has not yet been proven," Paul Quiles explained, "nor has its necessity. A breeder reactor policy would give France energy independence only within 30 years. That is the time needed to perfect the other new forms of energy."

But what does this breeder reactor, which is so much talked about now, really consist of. It is a nuclear super-power plant, an ideal thing according to its supporters, a diabolical thing according to its adversaries. The physicists, who perfected it during the fifties, and who then tested it for 20 years, came up with a fabulous reactor which makes more fuel than it consumes. Just as if your car were to produce gasoline while moving. Hence the name which the French atomic scientists gave to the country's first experimental breeder reactor: Phenix. Like the bird in Egyptian mythology, which, burned on a pyre, rises from its ashes.

Here is the catch: to run, this extraordinary machine is supplied with a radioactive fuel called plutonium. Several milligrams suffice to kill one man; several kilograms are enough to make an A-bomb.

It is of course this capability of breeder reactors to reconstitute their own fuel which today represents their main attraction. In the opinion of supporters, it should in the future replace conventional power plants. The latter use uranium as fuel. But this uranium exists in two varieties which we call isotopes 235 and 238. Isotope 235 is the only one that is "fissile." It breaks up and releases energy when it is bombarded by a neutron. The trouble is that natural uranium contains only 0.8 percent of isotope 235. A way has been found to "enrich" it, increasing its content of fissile 235 up to 3 percent. That is not enough. The fuel becomes useless after several years. And, because it is radioactive for centuries, nobody knows how to get rid of it.

Conventional power plants have another major inconvenience springing from the first one. They consume an enormous volume of mineral. Now, we are beginning to realize that uranium reserves are probably as limited as petroleum reserves. There are hardly more than 2 million tons of economically exploitable uranium in the world. In other words, enough to supply the conventional nuclear power plants for another 20 years. That is little for a technology presented as the best way to meet the exhaustion of petroleum deposits. That is when a last solution emerged, likewise a nuclear solution, but economical in terms of mineral--the breeder reactor.

"Fertile Matter"

The shell of the breeder reactor's boiler consists of a big steel vat. At the center, the reactor core contains the fuel, that famous plutonium, contained in long rods of inoxidable steel. Because it is highly radioactive, plutonium disintegrates while projecting very heavy neutrons, hence their name "fast neutrons." Like cannonballs they bombard the "fertile matter" arranged around the core. This matter is uranium 238 which, broken down by continuous bombardment, is changed into plutonium. The entire assembly produces a fantastic heat. This is so bad that only liquid sodium can recover it and transmit it to a water circuit which is turned into steam. This steam causes the electricity-generating turbines to turn. Atomic experts assure us that an explosion is impossible, that leaks are improbable, and that sodium fires are controllable.

The indispensable corollary of this new technique is the reprocessing of fission products. The operation is simple in theory: with the help of chemical solvents, the plutonium is separated from the uranium waste. This plutonium comes out in order once again to supply the core of the breeder reactor. The uranium resumes its function as fertile substance. Thus reprocessed, the same mineral can be used for several centuries. This is a dream of those who are responsible for energy policy. In France, with our 200,000 minable tons in reserve, we should therefore be able to go on for centuries. But there is one little key problem just the same--the problem raised by the handling of radioactive substances. Everything is done at a distance, with robots operated by workers protected behind armored walls. The chemical operations are controlled by computer and are carried out behind enormous concrete walls. This is a dangerous and incredibly complex technology.

Just 10 years ago, the Americans built a small breeder reactor of 400 Mw at Hanford. Then the British pulled ahead of them with the Doon Rea reactor, in the north of Scotland. The USSR was right behind them. France began in 1960 with a small experimental 40-Mw reactor called "Rapsodie" and built at Cadarache. The experiment was so satisfactory that Phenix was launched in 1968; with its 250 Mw it gives us a clearer idea as to the way this new technique works.

But the situation changed at the end of the seventies. In the United States, Jimmy Carter put breeder reactors on the list of forbidden items. For the American president, the multiplication of these power plants could only facilitate the proliferation of nuclear weapons because it places the basic product--plutonium--in circulation. In November 1977, Carter, against the advice of Congress, stopped the construction of the experimental reactor at Clinch River which was to produce 1,200 Mw.

In Great Britain, the ecological challenge kept growing. The French government decided to launch Super-Phenix, a prototype of industrial size, in spite of the big antinuclear demonstration at Creys-Malville in July 1977. France alone continues to pursue the perfection of breeder reactors--with the participation of the Germans and the Italians who are associated in the construction and future operation of Super-Phenix.

Last month, the 700-ton inoxidable steel vat, which envelops the Super-Phenix reactor was installed. The construction of the power plant is half-way along and, in spite of a delay of 6 months, it will produce electricity toward the end of 1983. France now has a good headstart over the other countries. These are countries which today keep wondering whether they were not wrong in abandoning the undertaking. That is quite correct if one does not hear the French rooster crowing around Malville. Mrs Thatcher herself, ready for her Canossa to learn the secrets of Super-Phenix, might pay F 500 million to enter the club. The Japanese say they are interested and the Americans claim that they admire us.

However the opposition to breeder reactors is not fading away anywhere. If, on the one hand, it is admitted that France has a good mastery of the technology involved in these new power plants, there is worry on the other hand: safety is not total and the energy produced by breeder reactors is still twice as expensive as the energy turned out by conventional power plants. Now the question comes out and it could be the subject of a debate in the National Assembly this autumn. Looking at breeder reactors, do we have a nuclear super-Concorde or a stroke of technological genius?

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